

Concerning: Hydrogen Brittleness of Steel
During Its Cathodic Polarization in
Sulfuric Acid

7007
SON/10-15-8-22/12

A similar relationship between tension limit and quantity of absorbed hydrogen was found by F. Krüger and H. Jungnitz (Z. techn. Physik, 17, 302 (1936)) for palladium wire. Increase in current density speeds up hydrogen absorption, while a rise in temperature slows down the process. Data on cathode potential, measured in investigated solutions (calomel electrode was used as a standard), are shown in Table 2.

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77047 SOV/80-35-2-12/52

Table 2. Magnitude of cathode potential of steel sample during its polarization in solutions of H_2SO_4 . Current density $D_C = 50 \text{ mA/cm}^2$. (All data (in v) are with a negative sign.) (1) Electrolyte; (2) temperature ($^{\circ}C$); (3) magnitude of cathodic potential at time of polarization; (4) 2 min; (5) 5 min; (6) 15 min; (7) 30 min; (8) solution H_2SO_4 0.1N: without additives; (9) 2.5 mg/l SeO_2 ; (10) 2.5 mg/l As_2O_3 ; (11) solution H_2SO_4 2N without additives.

(1)	(2)	(3)			
		(4)	(5)	(6)	(7)
(8)	15	0.734	0.733	0.799	0.684
	25	0.665	0.660	0.659	0.658
	30	0.603	0.608	0.610	0.595
(9)	15	0.697	0.715	0.711	0.713
	25	0.623	0.616	0.610	0.600
	30	0.540	0.540	0.506	0.488
(10)	15	0.781	0.781	0.795	0.789
	25	0.711	0.710	0.719	0.715
	30	0.689	0.700	0.695	0.682
(11)	15	0.565	0.572	0.572	0.567
	30	0.452	0.460	0.450	0.445

Card 6/8

Concentration Hydrogen Penetration of Steel
During the Cathodic Polarization in
Sulfuric Acid

70-97

DN/2-15-1-127

The obtained data led the authors to the conclusion that while in the absence of a catalyst, hydrogen is absorbed as atoms and its absorption is inversely proportional to the hydrogen overvoltage; in the presence of a catalyst, the penetration of hydrogen takes place in the form of protons, which are reduced to atoms inside of the metal. The atoms combine into molecules, causing a sharp decrease in steel strength, which is reflected in the sloped section of the curve in Fig. 4 (the last, level section of the curve indicates formation of microscopic fissures in the wire). The rate of absorption of protons does not depend upon hydrogen overvoltage. There are 8 figures; 2 tables; and 10 references, 4 Soviet, 2 Polish, 3 German, 1 U.S. Abstracter's note: There are 9 references listed, but one of them was broken down into two. The U.S. reference is: D. Smith, Hydrogen in Metals, The University of Chicago Press (1948).

Card 7/8

Concerning Hydrogen Brittleness of Steel
During Its Cyclic Relaxation
in Sulfuric Acid

77047
SOV/51-55-2-22/21

ASSOCIATION: Perm State University (Permskiy gosudarstvennyy
universitet)

SUBMITTED: June 11, 1978

Card 8/8

80

Influence of selenium compounds on saturation of steel with electrolytic hydrogen, and variation of its elasticity. M. N. FOLUKAROV and N. A. AVDEYEV (J. Appl. Chem. Russ., 1937, 10, 237-244). The tensile strength of steel wire cathodes subjected to electrolysis in 0.1N H₂SO₄, falls with increasing [Se] of the acid; the effect is considerable with [Se]₀ as small as 0.3 p.p.m., and is c.o.d. with [H₂SO₄] and temp. In equiv. concn. the action of Se^{IV} is > Se^{VI}, and of As^{III} is > As^V. The action of Se is inhibited by NO₃⁻, and is absent in alkaline solutions.

R. T.

10111111, E. N.

11/1/11

USSR/Chemistry - Copper Sulphate
Chemistry - Electrolysis

Jul 48

"Ultramicroscopic Studies of the Electrolysis of
Aqueous Solutions of Copper Sulphate," M. N.
Polukarov, Lab of Phys and Colloidal Chem, Molotov
State U, 9 pp

"Zhur Obshch Khim" Vol XVIII (LXXX), No 7

Ultramicroscopic studies of electrolysis of copper
sulphate solutions varying from 0.01N to 1N dis-
closed colloidal systems in cathode zone. These
play direct part in formation of cathode deposits.
Discusses effects of electrolyte concentration,
current density and impurities. Submitted
3 Jun 1947.

9/49732

Effect of tellurium on the hydrogenation of steel in its cathodic polarization in sulfuric acid solutions. M. N. Polukarov. *Zhur. Priklad. Khim.* (J. Applied Chem.) 21, 611-10 (1948). On the basis of the known relationship between satn. of steel with H_2 and drastic decrease of its tensile strength, the progress of hydrogenation was measured by the length of time τ necessary for an originally H_2 -free steel (C 0.83, Si 0.19, Mn 0.28, P 0.019, S trace) wire of 0.57-mm. diam., immersed in a H_2SO_4 soln., with an exposed surface of 1.8 sq. cm., to break under a const. load of 3 kg.; this load was about 1/2 of the load under which the H_2 -free wire would break. The shorter τ , the faster the cathodic satn. with H_2 under the given conditions of electrolysis. In purest H_2SO_4 , distd. once with MnO_2 and then twice without the addn., no break, i.e., no satn. with H_2 , was observed for hrs. In 0.1 N H_2SO_4 , at 11-12°, c.d. 0.2 amp./sq. cm., addn. of Te (in the form of TeO_2) in the amt. 0.06 mg. $Te/100$ ml., caused the wire to break after $\tau = 11$ min.; with $Te = 0.12, 0.5, 2$, and 8 , $\tau = 34, 27, 23$, and 22 min. At const. $Te = 1$ mg./100 ml., variation of the c.d. from 0.5 to 1.0 amp./sq. cm. caused a variation of τ from 27 1/2 to 70 min. At const. $Te = 1$, const. c.d. 0.2, increase of the concn. of H_2SO_4 from 0.1 to 2.0 N decreased τ from 25 to 5 min. At const. $Te = 1$, c.d. 0.2, const. H_2SO_4 0.5 N, τ increased from 12 1/2 to 34 min. with the temp. increasing from 11-12 to 43°; at 53°, no break occurred even after 100 min. but the wire was visibly embrittled. Again at const. $Te = 1$, c.d. 0.2, temp. 10°, in 0.1 N H_2SO_4 , addn. of Na_2SO_4 , 0.002-0.008 M gave $\tau \sim 20$ min., whereas no break occurred with Na_2SO_4 , 0.03-0.1 M, and not even embrittlement at 0.1 M. With $MgSO_4$, 0.002-0.02 M, τ embrittlement at 0.1 M. With $Al_2(SO_4)_3$, 0.002-0.02 M gave $\tau \sim 20$ min., no break with 0.04-0.1 M. Ultramicroscopic examn. of the soln. in the course of the electrolysis or at its end has established a complete parallelism between the count of colloidal particles of Te and the velocity of hydrogenation of the steel-wire cathode. Thus, introduction of 0.06 mg. $Te/100$ ml. gave, after 30-min. electrolysis, a count of colloidal particles $c = (60-70) \times 10^3$ /cu. mm.; further increase of the amt. of Te to 0.12 and 8.0 corresponded to $c = 800$ and 1800×10^3 , resp. Increase of the c.d. and of the concn. of H_2SO_4 , at const. amt. of Te, were found to increase c , and so did an increase of the temp. up to about 30-35°, whereas further increase of the temp. resulted in a diminution of c and loss of stability of the colloidal soln. Addn. of Na_2SO_4 , $MgSO_4$, and $Al_2(SO_4)_3$ depressed c , the efficiency decreasing in that order. In expts. in which no hydrogenation of the steel occurred, ultamicroscopic examn. at the end of the electrolysis showed absence of colloidal particles. Hydrogenation of steel and colloidal Te were also found in solns. of HCl and H_3PO_4 ; both were absent in alk. soln. All factors which favor formation and persistence of colloidal particles of Te also favor hydrogenation of the steel cathode, and vice versa. The role of the negatively charged colloidal Te particles in carrying the H_2 to the cathode metal is interpreted by adsorption of H_2 ions and formation of double layers which can be viewed as polar mols., susceptible of disocn., particularly in strong elec. fields. The lifetime of the free H^+ is estd. to 10^{-12} sec.; prior to the disocn., the H^+ vibrates at a frequency of the order of 10^{14} sec.⁻¹ which, at an amplitude of 10^{-8} cm., corresponds to a velocity of 10^8 cm./sec. In the 10^{-12} sec. of its free life, the H^+ can thus travel 10^{-8} cm., i.e. more than the distance between the colloidal particle and the cathode. It can insert itself at any point of the metal lattice.

N. Thon

CA 4

Ultramicroscopic investigation of the electrolysis of
solutions of silver nitrate. M. N. Polukarov (Molotov
State Univ.). *J. Gen. Chem. U.S.S.R.* 19, No. 9, 21-10
(1949) (English translation).—See *C.A.* 44, 955g.
E. J. C.

CA

Ultramicroscopic investigation of the electrolysis of silver nitrate solutions. M. N. Polukarov. *Zhur. Obshch. Khim.* (J. Gen. Chem.) 19, 1581-92 (1949). In originally, optically empty, neutral solns. of AgNO_3 , 0.0001-0.1 N, electrolyzed between Ag electrodes of 25-30 sq. mm., at a distance of 5 mm., at 18-20°, ultramicroscopic colloidal particles begin to appear around the cathode even before a voltage of 0.9-1.1 v. is reached; their d. increases with increasing diln., between 4×10^9 and 6×10^9 /cu. mm., and all particles formed immediately migrate towards the anode. At over 0.9-1.1 v., the no. of the particles increases considerably, reaching $6-7 \times 10^9$ /cu. mm. At lowest concns., 0.0001-0.0004 N, the colloidal particles surround the cathode at a distance of 0.08-0.2 mm., forming a layer 0.15-0.20 mm. thick, from the outer periphery of which the particles uninterruptedly migrate toward the anode where they eventually disappear from the field of vision. The min. c.d. at which these phenomena are observed depends on the concn., thus, at 0.0001, 0.0002, 0.0003, and 0.0005 N, it is 0.08, 0.12, 0.16, and 0.21 amp.

sq. cm. At intermediate concns., 0.0006, 0.0007, 0.001 and 0.002 N, min. c.d. 0.32, 0.48, 0.48, and 0.60 amp./sq. cm., the particles formed around the cathode still migrate towards the anode, but only after staying some time in the neighborhood of the cathode; the length of this time of stay increases with the concn., thus, at the above 4 concns., it is 5, 8, 10, 15, 40, 50, and 120-140 sec. From 0.003 N up to 0.1 N, an increasing fraction of the particles, rather than migrating away from the cathode, are seen to move to the cathode where they become part of the deposit. At 0.003, 0.005, and 0.01 N, c.d. 0.64, 0.80, and 1.92 amp./sq. cm., only 20-30, 20-25, and about 10%, resp., of the total no. of particles leave the cathodic region and move to the anode. At 0.025, 0.045, and 0.1 N, c.d. 4.80, 7.20, and 13.00 amp./sq. cm., all particles are absorbed by the cathodic deposit. At concns. higher than 0.01 N, each particle formed is almost instantaneously attracted to the cathode, and the count of individual particles becomes increasingly difficult. With increasing concn., the particles become increasingly closely packed, forming increasingly short and thick needles, and, finally, individual crystals. In the presence of HNO_3 , the phenomena remain essentially unchanged; addn. of a certain amt. of HNO_3 has the same effect as a corresponding increase of the concn. of AgNO_3 . Addn. of H_2SO_4 has essentially the same effect. This is proof that the colloidal particles observed are metallic Ag, not an oxide or hydroxide. In dil. soln., the region where the particles originate is depleted in cations, hence the particles move cathodetically to the anode owing to their neg. charge. In increasingly concd. soln., this motion is increasingly retarded by polarization and deformation of the pos. ion atmosphere surrounding each particle, and, at sufficiently high concn., the direction of the motion is reversed. N. Thon

And. Kuznetsov M. N.

341 AERE-145/Trans-514
ULTRAMICROSCOPIC INVESTIGATION OF THE FORMATION OF COLLOIDAL SYSTEMS IN ELECTROLYSIS AND THEIR ROLE IN THE ELECTRODEPOSITION OF METALS.
M. I. Polukarov. Translated by R. O. Murray from
Trudy Sovetskoy Akademii Elektrokhim. Akad. Nauk S.S.S.R.,
Otdel. Khim. Nauk, 458-53(1959) Dec, 19-25, 6p.

LM *WH*

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PA 192T36

USSR/Chemistry - Electrodeposition Sep 51
of Metals

"Ultramicroscopic Investigation of the Electrolysis of Nonaqueous Solutions of Silver Nitrate," M. N. Polukarov, Molotov State U

"Zhur Fiz Khim" Vol XXV, No 9, pp 1005-1013

Electrolysis of AgNO_3 in MeOH, EtOH, pyridine, and pyridine + MeOH was investigated ultramicroscopically. Formation of colloidal sols of Ag at the cathode was established. Formation of complex these sols is due to the discharge of complex

LC 192T36

USSR/Chemistry - Electrodeposition Sep 51
of Metals (Contd)

ions. Participation of colloidal Ag particles in formation of the cathodic metal deposit was established visually and a theory of this phenomenon formulated.

POLUKAROV, M. N.

LC

192T36

Ultramicroscopic Investigation of the Formation of Colloidal Systems in Electrolysis and Their Role in the Electrocrystallization of Metals. M. N. Polakarov (*Trudy Sovetskoi Khimii po Elektrokhimii* 1950, 1953, 388-393).—[In Russian]. P. investigated the formation of colloidal particles during electrolysis of aq. soln. of AgNO_3 , $\text{Pb(NO}_3)_2$, CuSO_4 , PtCl_4 , KAg(CN)_2 , the ammoniacal complexes of Ag, Cu, and Ni, and the pyridine complexes of these metals; soln. of AgNO_3 in methanol, ethyl alcohol, and pyridine; and various other soln. A quartz cell, contg. 1 mm² soln. and two electrodes (thin wires or strips, either of Pt or coated with the metal being plated) 5 mm. apart, was used in conjunction with a slit ultramicroscope. The formation of colloidal soln. of the metal at the cathode can assist the operation of the bath and give good throwing power. Pyridine addn. help to produce good deposits.—E. V. R. T.

MG

PH

Polukarov, M.N.

U S S R

✓ Ultramicroscopic investigation of the electrolysis of sulfurous and selenous acids and their mixtures with sulfuric acid. M. N. Polukarov. *Uchenye Zapiski Molotov. Univ.* 8, No. 1, 147-153 (1953). *Referat. Zhur., Khim.* 1954, No. 42781. — By using a method previously described (C.A. 43, 950g) it was ascertained that colloidal S and Se particles were formed near the cathode during the electrolysis of 0.001-0.1N SO_2 , 0.005-0.1N SeO_2 , and 0.01-0.5N H_2SO_4 solns. contg. various amts. of SO_2 and SeO_2 . In dil. SO_2 and SeO_2 solns. the colloidal particles moved primarily toward the anode and formed fairly stable colloidal solns. of S and Se in acid media. Increase in H^+ concn. favored the formation of colloidal particles in the cathode area. At appreciable SO_2 and SeO_2 concns., and particularly in the presence of H_2SO_4 , the colloidal particles migrated toward the cathode. This confirmed the previously (C.A. 44, 956g) advanced idea that neg. charged particles could move toward the cathode when the ionic strength of the soln. was sufficiently high. It also explained the effect of SO_2 and SeO_2 on cathodic H absorption of steel at increasing H_2SO_4 concns. M. Hoch.

[Handwritten signature]

POLUKAROV, Mikhail Nikolayevich

Academic degree of Doctor of Chemical Sciences, based on his defense,
13 October 1954, in the Council of Moscow Order of Lenin Chemical
and Technological Inst imeni Mendeleyev, of his dissertation entitled:
"Investigation of the Formation of Colloids during Electrolysis and
their Role in Cathode Processes."

Academic degree and/or title: Doctor of ^{Chemical} Sciences

SO: Decisions of VAK, List no. 1, 7 Jan 56, Byulleten' MVO SSSR, Uncl.
JPRS/NY-548

POLUKAROV M. N.
KIRILYAKOV G. G.

PHASE I BOOK EXPLOITATION SOV/2216

5 (4)

Soveshchaniye po elektrokimii. 4th, Moscow, 1956.

Trudy... [aborniki] (Transactions of the Fourth Conference on Electrochemistry: Collection of Articles) Moscow, 1956, 220-vo AN SSSR, 1959. 868 p. Errata slip inserted. 2,500 copies printed. Sponsoring Agency: Akademiya nauk SSSR. Otdeleniye khimicheskikh nauk.

Editorial Board: A. N. Prumkin (Resp. Ed.) Academician, O. A. Yasin, Professor, S. I. Zhdanov (Resp. Secretary), B. N. Kabanov, Professor, Ya. M. Kolotyrkin (Doc. of Chemical Sciences), V. V. Losev, P. D. Lukovtsev, Professor, V. V. Stender, Professor, and O. M. Florjanovich; Ed. of Publishing House: N. O. Yegorov; Tech. Ed.: T. A. Prusakova.

PURPOSE: This book is intended for chemical and electrical engineers, physicists, metallurgists and researchers interested in various aspects of electrochemistry.

COVERAGE: The book contains 127 of the 138 reports presented at the Fourth Conference on Electrochemistry sponsored by the Department of Chemical Sciences and the Institute of Physical Chemistry, Academy of Sciences, USSR. The collection pertains to different branches of electrochemical kinetics, double layer theories and galvanic processes in metal electrodeposition and industrial electrolysis. The included discussions are given at the end of each division. The majority of reports not included here have been published in periodical literature. No personalities are mentioned. References are given at the end of most of the articles.

Aslads, R. I. Hydrometallurgical Production of Manganese and Chromium

Titov, P. S., and Z. A. Turyashkina (Institut zavetnykh metallov i solota imeni M. I. Kalitina-Institute of Nonferrous Metals and Gold Imeni M. I. Kalitina). Cathodic Process During the Deposition of Tin From Halogen Electrolytes 493

Polukarov, M. N. (Pernskiy Gosudarstvennyy universitet-Pern'skiy Gosudarstvennyy Universitet). Hydrogen Absorption by Steel Cathodes in the Metal Electrodeposition Process 498

Zhoglina, V. M., and B. Ya. Karnachey. Electrodeposition of Hard Magnetic Alloys 502

Kadnar, L. I., and A. Kh. Masik (Pedagogicheskii institut imeni sovetskoy revolyutsii, Kharkov-Pedagogical Institute of Soviet Trade). Mechanism of Electrolytic Deposition of Metals Onto a Passivated Surface 506

Card 20/ 34

POLUKAROV, N.A.; SMIRNOV, V.I.

Behavior of selenium and tellurium during the sulfatizing roasting
of the pulp. Trudy Ural. politekh. inst. no.98:24-32 '60.

(MIRA 14:3)

(~~Selenium-Metallurgy~~) (~~Tellurgium-Metallurgy~~)

POLUKAROV, M.N.; ANDREYCHIKOVA, V.Ya.

Effect of tin coatings on the electrodiffusion of hydrogen in steel.
Zhur.fiz.khim. 37 no.7:1527-1531 J1 '63. (MIRA 17:2)

1. Permskiy gosudarstvennyy universitet.

L 17710-63

EWP(q)/EWT(m)/BDS AFPTC/ASD JD/JG

S/0076/63/037/007/1527/1531

60
57

ACCESSION NR: AP3004062

AUTHORS: Polukarov, M. N.; Andreychikova, V. Ya.

TITLE: Effect of tin coatings on electric diffusion of hydrogen in steel

SOURCE: Zhurnal fizicheskoy khimii, v. 37, no. 7, 1963, 1527-1531.

TOPIC TAGS: tin, tin coating, hydrogen, hydrogen diffusion, SnSO_4 , NaOH, KOH, H_2SO_4 , RM-50 testing machine, stannous sulfate, sulfuric acid

ABSTRACT: Authors studied the conditions under which tin coatings can be stimulators or inhibitors of electrolytically-separable hydrogen in steel. Authors used a method based on measurement of the change in rupture stress of a steel wire during its hydrogen absorption. This method permitted a conclusion to be made concerning the presence or absence of hydrogen absorption by the steel without any serious changes in the tin coating during period of experiment. Authors used a steel wire of 0.25 mm diameter. Rupture stress was 15.4 kg (316 kg/cm²). The wire was coated with tin and then rinsed in distilled water. The wire was then placed into an electrolytic cell filled with H_2SO_4 , NaOH or KOH solutions, after which cathode polarization took place. Electrolyte was composed of SnSO_4 , H_2SO_4 , gelatin, and phenol. The coatings were deposited from an electrolyte containing only SnSO_4 and H_2SO_4 in a part of the experiments. The rupture

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L 17710-63

ACCESSION NR: AP3004062

stress was determined on an RM-50 machine. The rupture stress of the wire did not change after being tin coated, which indicates absence of hydrogen absorption by the steel during the coating process from the electrolytes. Analyses showed that the deposition of a thin coating of tin (less than 1.6 microns) on the steel stimulates hydrogen absorption during cathode polarization in dilute H_2SO_4 solutions. No changes in the rupture stress were observed during polarization in more concentrated solutions (2-5 N) as well as in NaOH and KOH solutions. Stimulating action is explained by the formation of a colloid solution of SnO_4 at the cathode. There is no parallelism between hydrogen absorption and polarization effect. The observed fall in hydrogen overvoltage is explained by the depolarizing action of hydride ions. Orig. art. has: 5 figures.

ASSOCIATION: Permskiy gosudarstvennyy universitet (Perm State University)

SUBMITTED: 04Jul62

DATE ACQ: 15Aug63

ENCL: 00

SUB CODE: PH, CH

NO REF SOV: 012

OTHER: 001

Card 2/2

1.1800 1521 1087

30640

S/081/61/000/020/044/089

B107/B101

AUTHORS: Polukarov, M. N., Gerasova, S. S., Rapoport, I. P.

TITLE: Effect of mercury chloride additions to electrolytes on the absorption of hydrogen by steel during cathodic polarization

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 20, 1961, 258, abstract 201137 (Izv. Yestestvennonauchn. in-ta pri Permsk. un-te, v. 14, no. 4, 1960, 3 - 11)

TEXT: The authors found the following: Addition of HgCl_2 to NaOH solutions considerably reduces the tensile strength limit of steel subjected to cathodic polarization in these solutions. Such an effect is not observed during polarization in H_2SO_4 solutions with the same addition. X

The tensile strength also decreases considerably during zinc-plating of steel wire in dilute cyanide and zincate electrolytes. This is not observed during zinc-plating in acid solutions. The changes in tensile strength of steel and the differences of these changes in the polarization in alkaline and acid electrolytes are explained by the different

Card 1/2

POLUKAROV, P.

27-8-27/32

SUBJECT: USSR/Schooling

AUTHOR: Polukarov, P.

TITLE: In Cooperation with the Base Enterprise (V Sodruzhestve s Bazovym Predpriyatiyem)

PERIODICAL: Professional'no - Tekhnicheskoye Obrazovaniye, Aug 1957, #8, p 32, (USSR)

ABSTRACT: The short notice points out the technical help given the Popasnaya Technical School # 11 by the personnel of the local locomotive depot, who lecture occasionally at the school. The school prepares specialists for the Donetsk Railroad.

INSTITUTION: Popasnenskoye Tekhnicheskoye Uchilishche No 11 (The Popasnaya Technical School # 11)

PRESENTED BY:

SUBMITTED:

AVAILABLE: At the Library of Congress.

Card 1/1

POLUKAROV, V.

Traffic accident graph. Za bezop.dvizh. 3 no.12:14-15 D '60.
(MIRA 14:1)

(Traffic accidents)

POLUKAROV, V.

A new main street. Za bezop.dvizh. 5 no.12:8-9 D '62.
(MIRA 16:1)

(Moscow—Streets)

POLUKAROV, V.

Without exception. Za bezop.dvizh. 5 no.8:11 Ag '62.
(MIRA 15:8)
(Traffic regulations)

POLUKAROV, V.

At an intersection. Za bezop.dvizh. 3 no.8:11-13 Ag '60.
(MIRA 13:11)

(Traffic accidents)

POLUKAROV, V.A.

Clinical aspects and treatment of proctosigmoiditis. Ekt. vop.
prokt. no.2:91-99 '63 (MIRA 18:1)

BONDAR', V.V.; MEL'NIKOVA, M.M.; POLEKHAROV, Yu.M.

Electrodeposition of magnetically hard Co-Mn-F alloys. *Zashch. met.*
1 no.5:534-538 S-O '65. (MIRA 18:9)

1. Vsesoyuznyy institut maushiny i tekhnicheskoy informatsii i Institut fizicheskoy khimii AN SSSR.

DUBININ, M.M.; GORBACHEV, I.V.; POLUKAROV, Yu.M.; CHESTOV, I.B.

Scientific activity of professor Ksenia Mikhailovna Gorbacheva, doctor
of chemical sciences; 1904-; on her sixtieth birthday. Zhur.til.khim. 38
no.8:2114-2115 Ag '64. (MIRA 185)

POLUKAROV, Yu.M.; GRININA, V.V.

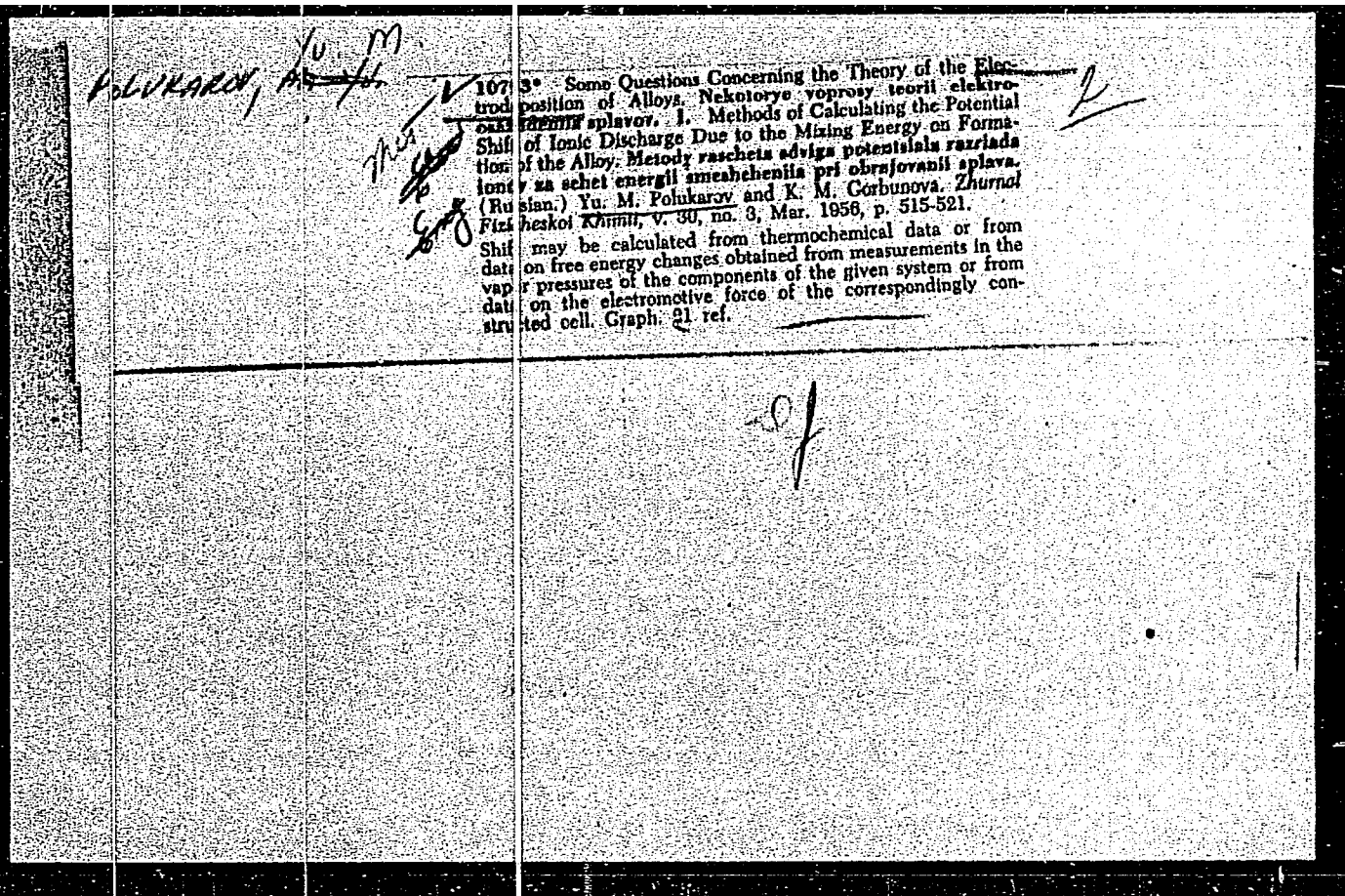
Some problems of the theory of the electrodeposition of alloys.
Part 12: Effect of surface-active agents on the phase structure
of electrodeposited copper-cadmium alloys. Elektrokimiia 1
no.3:350-353 Mr '65. (MIRA 18:12)

1. Institut fizicheskoy khimii AN SSSR.

POLUKAROV, Yu.M.; SEMENOVA, Z.V.

Structure of electrolytic silver deposits obtained at large
current densities. Elektrokhimiia 2 no.1:79-84 Ja '66.
(MIRA 19:1)

1. Institut fizicheskoy khimii AN SSSR. Submitted March 1, 1965.



POLUKAROV, Yu.M.; GRININA, V.V.

Some problems of the theory of electrodeposition of alloys. Part 10:
Phase structure of electrolytic copper-lead alloys obtained from com-
plex electrolytes. Elektrokhimiia 1 no.1:31-35 Ja '65. (MIRA 18:5)

1. Institut fizicheskoy khimii AN SSSR.

POLUKAROV, Ya.M.; GRJNINA, V.V.

Some problems of the theory of electrodeposition of alloys.
Part III. Effect of surface-active substances on the phase
structure of electrolyte copper alloys. *Electrochimica
Acta* 1965, 10, 2217-2227. (MIRA 1966)

I. Institut Khimicheskoy Mekh. AN SSSR.

POLUKAROV, Yu.M.; GRININA, V.V.

Problems of the theory of the electrodeposition of alloys.
Part 9. Zhur. fiz. khim. 39 no.5:1176-1178 My '65.
(MIRA 18:8)

1. Institut fizicheskoy khimii AN SSSR.

L 3588-66 EWT(m)/EWP(i)/EWA(d)/EWP(t)/EWP(z)/EWP(b) IJP(c) JD/HW
 ACCESSION NR: AP5022661 UR/0365/65/G01/005/0534/0538
 621.357.7

AUTHOR: Bondar', V. V.; Mel'nikova, M. M.; Polukarov, Yu. M.

TITLE: Electrodeposition of hard magnetic Co-Mn-P alloys

SOURCE: Zashita metallov, v. 1, no. 5, 1965, 534-538

TOPIC TAGS: cobalt alloy, manganese containing alloy, phosphorus containing alloy, magnetic alloy, alloy electrolytic deposition, electrolyte composition, alloy film magnetic property

ABSTRACT: Experiments have been made to determine the optimum conditions for electrodeposition of thin films of Co-Mn-P alloy with high magnetic properties. Copper rods or foil or phosphorous bronze foil with an area of 4 cm², were used as cathodes, cobalt or platinum were used as anodes, and the electrolyte temperature was varied from 20, 40, and 60C, electrolyte acidity (pH) from 1.1 to 4.8, and current density from 0.5 to 5 a/dm². The best electrolytically deposited Co-Mn-P films — about 10-μ thick, with a saturation induction B_m of (8—11) x 10³ gs, a residual induction B_r of (6—7) x 10³ gs, a coercive force H_c of 800—6000C and a hysteresis-loop rectangularity factor B_r/B_m ranging from 0.65 to 0.85 — were obtained with an electrolyte containing 200 g/l CoCl₂·6H₂O, 25 g/l MnCl₂·4H₂O, Card 1/2

Polukarov, Yu. M.

12539* (Russian.) Some Questions Concerning the Electrodeposition of Alloys. II. Investigation of the Shift in the Ionic Discharge Potential During Alloy Formation, Investigated by the Method of the Shift in the Potential of the Alloying Metal. III. Conditions for Nearing of Metal Deposition Potentials at the Expense of Alloying Energy. Obshchaya teoriya i eksperimentalnye issledovaniya. Yu. M. Polukarov and K. I. Gorbunova. Zhurnal Fizicheskoi Khimii, v. 30, no. 4, Apr. 1956, p. 871-881.

By thermodynamical computation the possibility was demonstrated of co-precipitating Al and Ni from their aqueous solutions. Even for considerable interaction energies and correspondingly large shifts of the deposition potentials, the latter may not deposit together if the shifts are of the same order of magnitude.

of

POLUKAROV YU

✓ Examination of milk with aid of electron microscope. P. D'yachenko, R. Zhdanova, and Yu. Polukarov. *Molochayeva Press*, 16, No. 5, 35-7 (1959). ~~Skim-milk~~ contg. 0.18% HCHO, stored for 24 hrs. at 5-7°, and diltd. 1:300 w/ th dist. water was used in a study of the size-distribution of casein particles (I) by means of an electron microscope. Aprox. 1/3 of I were less than 400, 1/4 were 400-800, and 1/4 were 800-1200 Å.; less than 10% ranged from 1200 to 2000 Å. Microphotographs of I. in HCHO-treated, fermented, and CaCl₂-contg. samples of milk are given.
Vladimir N. Krukavsky

(2)

POLUKAROV, YU. M.

18 4E2C
Some Problems Concerning the Theory of Electrodeposition of Alloys. II.—Investigation of Shift of Potential of Ionic Discharge During Formation of an Alloy. Yu. M. Polukarov and K. M. Gorbunova (Zhur. Fiz. Khim., 1956, 30, (4), 871-877).—[In Russian]. During electrodeposition of alloys a change in partial

molar free energy of components occurs, and consequently the equivalent potential of components should shift into a positive direction by the quantity $\Delta E_{\text{eq}} = \phi/nF$, where ΔE_{eq} = quantity of change of equivalent potential due to interaction of energy, ϕ = change of partial molar free energy, n = valency, F = Faraday const. H. and G. investigated the possibility of utilizing this shift to solve problems of non-equilibrium processes of discharge of ions during electrodeposition. Zn is deposited on Cu at a more positive potential than Zn deposited on Zn. For the systems Mg-Cd and Mg-Al it is impossible to obtain accurate readings, but values obtained experimentally are of the same order as the calculated values. For Mg-Bi deposition ΔE_{eq} obtained from polarization curves are slightly higher than calculated. In the course of investigation a possibility of co-deposition of Ni-Al and Co-Al was revealed theoretically and proved experimentally. Alloys of Ni and Co with Al contg. 4-5% Al could be obtained from soln. contg. 80 g/l. $\text{Al}_2(\text{SO}_4)_3$ and 200 g/l. citric acid.—A. W.

RB JF
GAY

Polukarov, Y. M.

Mechanism of growth and the structure of metal precipitates formed during the electrocrystallization process. K. M. Gerasimova, O. S. Popyayeva, A. A. Sutyagina, and Yu. M. Polukarov. *Russ. Kristallogr. Akad. Nauk S.S.S.R., Inst. Kristallogr., Doklady Sovetskoye, 1956, 68-69 (Pub. 1957).*—A. P. K.

5

128

POLUKAROV, Yu.M.; KUZNETSOV, V.A.

"Aging" of electrolytic copper deposits. Zhur fiz. khim. 36
no.11:2382-2387 N'62. (MIRA 17:5)

1. Institut fizicheskoy khimii AN SSSR.

S/564/57/000/000/003/029
D258/D307

AUTHORS: Gorbunova, K. M., Popova, O. S., Sutyagina, A.
A., and Polukarov, Yu. M.

TITLE: Mechanism of growth and structure of metallic
deposits formed during electrocrystallization

SOURCE: Rost kristallov; doklady na Pervom soveshchanii
po Rostu kristallov, 1956 g. Moscow, Izd-vo
AN SSSR, 1957, 58-66

TEXT: The present article is a review of some of the authors' earlier studies and other work; attention is focused on some regularities concerning the cathode deposition of metals, as dense or porous, dendritic, coatings. An increase in the electrolysis current leads to an increase in the surface of the crystallizing metal, leading to an increase in the number of crystals or to dendritization, according to conditions. Powder deposition (fine dendrites) occurs at the saturation current.

Card 1/2

Mechanism of growth...

S/564/57/000/000/003/029
D256/D307

Properties of such polydendritic and of dense galvanic coatings are indicated, and conditions leading to the formation of electrolytic deposits with a predetermined crystal orientation are discussed with particular reference to the earlier work of Gorbunova. It is believed that orientation may be ascribed to the unequal rates of growth of variously oriented crystals. Possible mechanisms for the formation of texture on coatings are indicated. An account is also given of the authors' earlier study of internal stresses in galvanic coatings, particularly in the presence of surface-active compounds, and of the conditions leading to coatings possessing difference surfaces. There are 6 figures and 16 references: 12 Soviet-bloc and 4 non-Soviet-bloc.

Card 2/2

POLUKAROV, Yu.M.; RASTORGUYEV, L.N.; SHEVKUN, I.G.

Magnetic properties and structure of electrolytic deposits of
a cobalt-tungsten alloy. Zhur. fiz. khim. 36 no.6:1299-1305
Je'62 (MIRA 1757)

1. Institut fizicheskoy khimii AN SSSR.

L 17924-63

EWI(1)/EWG(k)/EWP(q)/EWI(m)/BDS AFFTC/ASD/ESD-3/IJP(C)

P2-4 AT/JD

ACCESSION NR: AT3002444

S/2935/62/000/000/0093/0100

AUTHOR: Smirnov, G. V.; Polukarov, Yu. M.; Arslambekov, V. A.

TITLE: Effect of electrochemical treatment upon the rate of surface recombination of germanium in various gas media [Report at the Conference on Surface Properties of Semiconductors, Institute of Electrochemistry, AN SSSR, Moscow, 5-6 June 1961]

SOURCE: Poverkhnostnyye svoystva poluprovodnikov. Moscow, Izd-vo AN SSSR, 1962, 93-100

TOPIC TAGS: germanium, germanium surface characteristics

ABSTRACT: Single-crystal specimens of n-Ge with a resistivity of 10 ohms.cm and a diffusion length of 1.2 mm (also with 40 ohms.cm and 2.5 mm) were ground, etched, and washed, after which surface-recombination measurements were made by the photoconductivity-drop method. The measurements were conducted under these conditions: atmospheric air, 10^{-6} - 10^{-7} -torr vacuum, heating to 120C with restoration of the vacuum, dry oxygen, and atmospheric air. Investigation by a high-sensitivity precision vacuum quartz damped balance revealed that, as a result of holding Ge in humid atmosphere, a relatively large quantity of moisture (up to 20 microgram/cm²)

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L 17924-63

ACCESSION NR: AT3002444

or 2,000-Å-thick film) can be adsorbed by Ge. It is assumed that water vapor reacts chemically with the Ge surface oxide film. Rates of surface recombination were measured as functions of these variables: vacuumizing time, potential of anode polarization in distilled water, and temperature. "The authors wish to thank Professor, Dr. of chemical sciences K. M. Gorbunova for her interest in the work, valuable hints, and advice." Orig. art. has: 4 figures.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR (Institute of Physical Chemistry, AN SSSR)

SUBMITTED: 00

DATE ACQ: 15May63

ENCL: 00

SUB CODE: PH

NO REF SOV: 002

OTHER: 006

Card 2/2

POLUKAROV, Y. M.

Zhurnal Fizicheskoi

Khim 2,

Vol. 31, Nr. 12, 1957, p. 2612

SOME PROBLEMS IN THE THEORY OF THE ELECTRODEPOSITION OF ALLOYS

V. A. OSCILLOGRAPHIC INVESTIGATION OF THE CATHODE POTENTIAL
IN THE DEPOSITION OF ALLOYS OF THE SYSTEM COPPER-ZINC,
COPPER-LEAD AND NICKEL-COBALT

Yu. M. Polukarov and N. M. Garbunova (Moscow)

Summary

The paper presents the results of an oscillographic investigation of the changes in the cathodic potential with time, depending upon the character of the alloy being formed (solid solution or an eutectic type of system). The investigation of the process of deposition was made on the alloys copper-zinc, copper-lead and nickel-cobalt. Based on these results, as well as those of supplementary experiments recording the cathodic potential in the process of copper and zinc deposition from the cyanide solution and the evolution of hydrogen at the copper and zinc surfaces, it has been established that the fluctuation in the potential during the precipitation of alloys is caused by the joint evolution of hydrogen. No specificities have been observed in the nature of the cathodic potential change during deposition of various types of alloys.

AUTHOR: Polukarov, Yu. M.

76-32-5-7/47

TITLE: Investigation of the Structural and Magnetic Properties of Electrolytic Ferromagnetic Metal and Alloy Deposits Depending Upon the Conditions of Formation (Issledovaniye stroeniya i magnitnykh kharakteristik elektroliticheskikh osadkov ferromagnitnykh metallov i splavov v zavisimosti ot usloviy ikh polucheniya). I. Nickel (I. Nikel')

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol. 32, Nr 5, pp. 1008-1015 (USSR)

ABSTRACT: Maurain (Ref 1), as well as Kaufmann (Ref 2) and K. V. Grigorov (Ref 3) and Elenbaas (Ref 3) carried out investigations of the magnetic properties of electrolytic deposits and of the coercive force. In the present paper data on the influence of the current density, the solvent acidity, the mixing and temperature conditions of the electrolyte, the use of a.c. and the addition of some surface-active substances on the magnetic properties of the electrolytic nickel deposits are given. From the experimental part can be seen that a ballistic measuring device, as well as an oscillograph, the diagram of which is given, were used, the phase deformation of the latter having been

Card 1/3

Investigation of the Structural and Magnetic Properties of 76-32-5-7/47
Electrolytic Ferromagnetic Metal and Alloy Deposits Depending Upon the
Conditions of Formation. (I. Nickel)

avoided according to the method by G. S. Veksler (Ref 7). Layer thicknesses of at least 20μ were produced and the texture was determined according to the method by V. I. Arkharov (Ref 9). The results obtained showed that the coercive force increases with the current density and that it decreases a little with the temperature rise of the electrolyte and of the mixture. The latter phenomenon can be brought into connection with the increase in dimension of the crystals. In using a.c. the coercive force of the deposits decreases, the values, however, remaining rather high. The addition of surface active substances exerts an influence on the magnetic properties and does not effect any increase of the gloss of the deposits. The results of the investigations concerning the influence of the hydrogen included in the deposits show that, corresponding to the data by A. L. Rotinyan, E. Sh. Ioffe et al (Ref 15) there is no connection with stresses in the deposit, whereas a special effect of the 2,6-2,7 disulphonaphthalic acid on the magnetic properties was observed. The strongest change of the coercive force takes place at $250-350^{\circ}$ corresponding .

Card 2/3

SOV/137-59-1-1999

Translation from: Referativnyy zhurnal. Metallurgiya, 1959, Nr 1, p 263 (USSR)

AUTHOR: Polukarov, Yu. M.

TITLE: Investigation of the Structure and Magnetic Characteristics of Electrolytically Deposited Nickel in Relation to the Conditions of Its Precipitation (Issledovaniye stroyeniya i magnitnykh kharakteristik elektroliticheskikh osadkov nikelya v zavisimosti ot usloviy ikh polucheniya)

PERIODICAL: Sb. nauchn. tr. Mosk. in-t tsvetn. met. i zolota, Nauchno-tekhn. o-vo tsvetn. metallurgii, 1957, Nr 30, pp 342-361

ABSTRACT: An investigation was made of the effect of D, pH of the solution, agitation and temperature of the electrolyte, application of alternating current and additions of surface-active agents (SAA) (2.6-2.7 disulphonaphthalenic acid, thiourea, alylthiourea, and aniline) on the magnetic characteristics (MC) of the electrolytic Ni deposits (ED). On a ballistic apparatus having a sensitivity of 0.045 maxwell/mm the magnetization curve was plotted, and H_C , residual and maximum induction B_r , and the initial susceptibility were measured.

Card 1/3 Simultaneously an investigation of the structure of ED was carried

SOV/137-59-1-1999

Investigation of the Structure and Magnetic Characteristics (cont.)

out by the electron-microscope, X-ray diffraction, and electron-diffraction methods. The electrolyte contained (in g/liter): $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$ 140, $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$ 30 and H_3BO_3 30; electric current was passed through it for 15-20 hours, it was filtered, and its pH was adjusted. At pH 3.2 and with the cathode cd increasing from 20 to 30 ma/cm² the magnitude of H_c increases to 90 oersted (as against 2 per the tabular data). With a cathode cd=10 ma/cm² and upon an increase of pH from 2 to 6, H_c and σ increase from 70 to 90 oersted and from 30 to 40 kg/mm², respectively, whereas B_r decreases from 1900 to 1200 gauss. With pH 3.2 and a 20-60° increase in temperature, H_c decreases from 95-55 oersted; upon application of alternate current H_c decreases somewhat. Upon introduction of SAA into the bath a decrease in H_c [H in Russian text; Trans. Note] and B_r occurs, and a linear relationship between the magnetization of the specimen and the magnetizing field is observed up to the saturation point. Heating ED to 700°C in a vacuum for 20 hours proved inadequate for the production of normal MC, although internal stresses and H were removed. This points to the fact that large amounts of SAA were included in the ED, did not separate at this temperature, and affected the MV. The increase of H_c and decrease of B_r with an increase of the cathode cd are connected with the increase of the tensile stresses in ED and increase of pH. The decrease of H_c upon an introduction of SAA into the electrolyte is related to a change in the structure of the ED. It is established that contamination by H of the ED has no effect on its MC.

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SOV/137-59-1-1999

Investigation of the Structure and Magnetic Characteristics (cont.)

Changes in the amount of H contaminating the ED are related to changes in the degree of dispersion. Bibliography: 23 references.

O. P.

Card 3/3

AUTHORS: Bondar', V. V., Polukarov, Yu. M. 30V/20-110-5-72/67

TITLE: The Phenomenon of Zone Formation on Electrodes in the Process of the Electric Crystallization of Metals (Izmeneniye zonoobrazovaniya na elektrodakh v protsesse elektrokristallizatsii metallov)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 120, Nr 3, pp.552-553 (USSR)

ABSTRACT: The authors investigated the electric precipitation of alloys (Cu-Pb, Cu-Zn, Cu-Bi, Cd-Bi, Cu-Sn) as well as of pure metals (Cu, Ni, Co, Zn, Bi and others) and of the dissolution of copper on the anode under conditions analogous to those prevailing during the experiments carried out by Arndt (Ref 4). In all cases distinctly marked concentrical zones were formed. According to radiographical tests the precipitations of the alloys in the various zones differ by their phase composition. The nonuniform current distribution on the cathode gives rise to different values of the potential in the center and on the periphery of the cathode. The authors carried out measurements of the potential of the cathode in its various parts. A diagram shows the curves obtained for

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POV/20-120-3-32/67

The Phenomenon of Zone Formation on Electrodes in the Process of the
Electric Crystallization of Metals

the change of potential with increasing distance from the center of the cathode. The material found experimentally seems to indicate that transition from one zone to another takes place at certain strictly definable potentials only. The character of zone distribution depends on the composition of the electrolyte as well as on the distribution of the current on the surface of the electrode. Also in the course of the electric precipitation of pure metals the forming of zones may be observed. In this case the zones are distinguished from one another by the size, orientation, and by the nature of the boundaries of the crystals contained in them. In the case of the deposits of pure metals the forming of zones is apparently due to the difference in the electrochemical conditions of the precipitation. There are 2 figures, 1 table, and 8 references, 3 of which are Soviet.

PRESENTED: October 4, 1957, by A. N. Frumkin, Member, Academy of
Sciences, USSR

Card 2/3

100/20-120-5-32/67

The Phenomenon of Zone Formation on Electrodes in the Process of the
Electric Crystallization of Metals

SUBMITTED: October 4, 1957

- | | |
|------------------------------------|-----------------------------|
| 1. Electrodes--Structural analysis | 2. Electrodes--Radiographic |
| analysis | 3. Alloys--Electrolysis |
| 5. Anodes--Properties | 4. Metals--Electrolysis |

Card 3/3

5(4)

SOV/26-123-4-41/53

AUTHORS: Polukarov, Yu. M., Bondar', V. V.

TITLE: The Dependence of the Structure of the Surface of Electrolytic Deposits of Alloys on Their Phase Composition (Zavisimost' stroeniya poverkhnosti elektroliticheskikh osadkov splavov ot ikh fazovogo sostava)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 4, pp 720-721 (USSR)

ABSTRACT: Extensive material has hitherto been collected concerning electric deposits of alloys. However, the influence exercised by structural factors and the character of component interaction in the formation of alloys (by which the physico-chemical properties of the coating are, to a great extent, determined), have received but little attention. According to the results obtained by the present paper the forming of the non-equilibrium phase of an oversaturated solid solution is connected with a considerable structural variation of the surface of the deposit. In order to reduce the influence exercised by secondary factors upon the surface structure of deposits to a minimum, investigations were carried out on such metals as permit common depositing without the addition

Card 1/4

SOV/20-125-4-41/53

The Dependence of the Structure of the Surface of Electrolytic Deposits of Alloys on Their Phase Composition

of surface-active or complex-forming substances to the solution. The system copper-bismuth is particularly well suited for this purpose. When using the solution $\text{Cu}(\text{ClO}_4)_2$ 0.6 N, $\text{Bi}(\text{ClO}_4)_3$ 0.4 N, pH 0.6 (solution I), alloys were obtained which contain the phase of the oversaturated solid solution of bismuth and copper (with a corresponding increase of the copper lattice parameter up to 3.635 - 3.645 Å). The bismuth content in the solid solution increased with current density and, according to the data of radiographic measurements, it attained 12 per cent by weight. With a further increase of current density, the lattice was disturbed to such an extent by the increase of oversaturation, that the lines on the X-ray picture vanished completely. A figure shows electron-microscopic pictures of deposits of alloys with different bismuth content. With an increasing oversaturation of the solid solution, the surface of the deposit becomes smoother, and if oversaturation is considerable it becomes glossy. The deposits forming in a solution $\text{Cu}(\text{ClO}_4)_2$ 0.2 N, $\text{Bi}(\text{ClO}_4)_3$ 0.8 N, pH 0.6 (solution II) are a mixture of pure copper-

Card 2/4

SOV/20-123-4-41/53

The Dependence of the Structure of the Surface of Electrolytic Deposits of Alloys on Their Phase Composition

and bismuth crystals. The dependence of deposit structure of an alloy on its phase composition is confirmed also by the data on copper-tin and tin-lead alloys. The third figure shows a photograph of the surface of the deposit of the alloy copper-tin. This deposit was of a dense and finely-crystalline nature. When obtaining a tin-lead alloy from the solution $\text{Sn}(\text{ClO}_4)_2$ 0.8 N, $\text{Pb}(\text{ClO}_4)_2$ 0.2 N, HClO_4 1N, no forming of oversaturated solutions was observed according to the data obtained by radiographic investigations. Deposits had a coarse-crystalline structure. The forming of oversaturated solid solutions exercises an essential influence upon the structure of electrolytically deposited alloys in that it promotes the formation of finely-crystalline deposits. Finely-crystalline and glossy deposits are thus to be expected whenever electrochemical conditions promote the production of oversaturated solid solutions. There are 3 figures and 11 references, 6 of which are Soviet.

Card 3/4

SOV/20-123-4-41/53

The Dependence of the Structure of the Surface of Electrolytic Deposits of Alloys on Their Phase Composition

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR
(Institute of Physical Chemistry of the Academy of Sciences,
USSR)

PRESENTED: July 14, 1958, by A. N. Frumkin, Academician

SUBMITTED: June 21, 1958

Card 4/4

GERBEROVA, K.M.; NIKIFOROVA, A.A.; POLSKAROV, Yu.M.; MOISEYEV, V.F.

Magnetic properties of nickel reduced by hypophosphite from
alkaline solutions. Zhur. fiz. khim. 38 no.6:1555-1558 Fe 1964.
(MIRA 18:3)

1. Institut fizicheskoy khimii AN SSSR, Moskva.

POIUKAROV, Yu.M.; GRINIINA, V.V.

Some problems of the theory of alloys electrodeposition. Part 13:
Phase structure of copper-cadmium electrolytic alloys obtained
from complex electrolytes. Elektrokhiimiia 1 no.4:433-438 Ap '65.
(MIRA 18:6)

1. Institut fizicheskoy khimii AN SSSR.

36L30

S/076/62/036/006/004/011

B101/B144

18.11.41

AUTHORS: Polukarov, Yu. M., Rastorguyev, L. N., and Shevkun, I. G.
(Moscow)

TITLE: Study of the magnetic properties and structure of
cobalt - tungsten alloys deposited electrolytically

PERIODICAL: Zhurnal fizicheskoy khimii, v. 36, no. 6, 1962, 1299-1305

TEXT: The production of high-coercive coatings for magnetic recording by electrodeposition of Co-W alloys was studied. Experiments were made with two solutions. Solution 1 containing 12.5 g/l of cobalt sulfate, 39 g/l of sodium tungstate, 66 g/l of citric acid (pH = 7.1, 70°C), yielded deposits with only low saturation magnetization and low coercive force, in which the B_r/B_m ratio was 0.05 - 0.1. These deposits had crypto-crystalline surfaces showing only indistinct radiographic reflexes. Solution 2, which proved to be ideal, contained: 110 g/l of cobalt sulfate, 25 g/l of sodium tungstate, 200 g/l citric acid (pH = 9.1 - 9.8; addition of NH_4OH). The coercive force of the deposits

Card 1/2

Study of the magnetic...

S/076/62/036/006/004/011
B101/B144

increased with the current, reaching a maximum of 500 - 600 oersted at 100 - 150 ma/cm², pH = 3.4 - 9.8, and a cathode potential of 0.70-0.75 v. Electron microscopic studies showed the surface to have oblong crystals. X-ray structural analyses proved the alloys (30% W) to be heterogeneous: they consisted of a solid and often oversaturated solution of W in Co, and of the C₃W phase. Partial oxidation of cobalt to Co³⁺ in the NH₄OH medium, explains the increase in coercive force when the electrolytes used were not freshly prepared. There are 6 figures and 3 tables. The most important English-language reference is: T. R. Hoar, J. A. Bucklow, Trans. Inst. Metal. Finish, 32, 186, 1954-55. ✓

ASSOCIATION: Akademiya nauk SSSR, Institut fizicheskoy khimii
(Academy of Sciences USSR, Institute of Physical Chemistry)

SUBMITTED: September 27, 1960

Card 2/2

S/076/62/036/009/001/011
B101/B102

AUTHORS: Polukarov, Yu. M., Gorbunova, K. M., and Bondar', V. V.
(Moscow)

TITLE: Some problems of the alloy electrodeposition theory. VIII.
Study of the dependence of copper alloy phase structure on
the electrochemical conditions of deposition

PERIODICAL: Zhurnal fizicheskoy khimii, v. 36, no. 9, 1962, 1870 - 1876

TEXT: The electrodeposition of supersaturated solid solutions of lead, thallium, tin, or cadmium in copper from solutions of perchlorates (Pb-Cu, Sn-Cu, Cd-Cu) or of sulfates (Sn-Cu), or nitrates (Tl - Cu) was investigated. In all cases, the deposition of Pb, Tl, Sn, and Cd started at more positive potentials than would correspond to the equilibrium potential of these metals, and the lattice constant of the copper was greatly expanded. The solid Sn-Cu solution contained more than 22% Sn, the lattice constant was 3.75 Å, and at a cathode potential more positive than -130 mv the $\text{Cu}_{31}\text{Sn}_8$ phase (high-temperature δ -phase) was formed. The solid Cd-Cu

Card 1/2

S/783/61/000/000/001/006
1003/1203

AUTHOR: Polukarov, Yu. M.

TITLE: Production of electroplated coatings with special magnetic properties

SOURCE: Elektroliticheskoye osazhdeniye splavov, Mosk. dom nauchno-tekh. propagandy. Moscow, Mashgiz, 1961, 57-75

TEXT: This is a review of the progress achieved in the field of the electrolytic deposition of both magnetically soft and hard alloys, supplemented by investigations carried out by the author. The mechanism is discussed of the electrodeposition from different electrolytes of nickel-cobalt and of cobalt-tungsten alloys with a high coercive force, and also the influence of the composition, of the temperature and of the pH of the electrolyte and of the current density on the physicochemical properties of the alloy. The crystal structure of Co-W alloys was determined from X-ray photographs and it is assumed that Co_3W , an intermetallic compound, is formed after the deposit has been heated to 600°C . The production of good magnetically soft alloys is more complex and has been less investigated. The author deposited iron-nickel alloys from electrolytes containing either hydrochloric or sulfuric acid, and the lowest coercive

Card 1/2

S/076/62/036/011/006/021
B101/3180

AUTHORS: Polukarov, Yu. M., and Kuznetsov, V. A. (Moscow)

TITLE: "Aging" of electrolytic copper deposits

PERIODICAL: Zhurnal fizicheskoy khimii, v. 36, no. 11, 1962, 2382 - 2387

TEXT: The structure and behavior of copper deposits 2 - 10 μ thick were studied. Under the influence of additions of surface-active substances (thiourea, gelatin), complex formers (sodium pyrophosphate, sodium cyanide, ammonium hydroxide), and anions (SO_4^{2-} , ClO_4^-) to the electrolyte, and in dependence on deposition time, current density, and temperature. Results: (1) with thiourea, the physical properties of copper deposit obtained from sulfuric acid solution depend on deposition temperature and thiourea concentration. Deposits obtained at 25 - 40°C showed nearly constant resistivity; in those obtained at 15 - 20°C it fell about 35 - 40% in the first few hours after electrolysis. Deposits obtained at 15°C showed an internal stress of about 140 kg/cm², which decreased after the current was switched off. Those obtained at 40°C had higher stress but showed no subsequent decrease. X-ray analysis confirmed that the structure of deposits

Card 1/2

"Aging" of electrolytic copper deposits

S/076/62/036/011/006/021
B101/B160

obtained at different temperatures was different. (2) The same behavior was observed with gelatin. (3) Deposits from sulfuric and perchloric acid solutions behaved similarly. Without surface-active substances their resistivity remained constant. The same holds for cyanide, pyrophosphate, and ammoniacal solutions, but the resistivity of a copper deposit obtained from perchloric acid solution in the presence of diethanol amine decreased 47 - 50% within 24 hrs. Conclusions: Surface-active agents cause considerable lattice distortions and stacking faults. Aging after the current is switched off is due to ordering, which takes about 24 hrs. If the adsorption of surface-active substances can be reduced there will be less lattice distortion. There are 4 figures and 1 table.

ASSOCIATION: Akademiya nauk SSSR, Institut fizicheskoy khimii (Academy of Sciences USSR, Institute of Physical Chemistry)

SUBMITTED: May 23, 1961

Card 2/2

POLUKAROV, Yu.M.; GOREUNOVA, K.M.; BONDAR', V.V.

Some problems in the theory of the electrodeposition of alloys.

Part 7: Investigation of the phase structure of copper-bismuth alloys in relation to the electrochemical conditions of their production. Zhur.fiz.khim. 36 no.8:1661-1666 Ag '62.

(MIRA 15:8)

1. Institut fizicheskoy khimii AN SSSR.

(Bismuth-copper alloys)

(Electrochemistry)

POLUKAROV, YU. M.

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*Some Problems Concerning the Theory of Electrodeposition of Alloys. III.—Conditions of the Relation of the Deposition Potential of Metals to the Energy Set Free During Formation of an Alloy, Yu. M. Polukarov and K. M. Gorbunova (*Zhur. Fiz. Khim.*, 1956, 30, (4), 878-881).—[In Russian]. Cf. *ibid.*, p. 871; preceding abstract. The relationship is studied between the magnitudes of shift of potential of discharge of ions, due to the interaction energy during formation of an alloy, and the approach of the potential of deposition of a metal. It is shown that even considerable energy of interaction, and the shift of the potentials of deposition into a positive direction, may not lead to the approach of the potentials if the magnitudes of the shift for the two components are not of the same order. On the basis of the investigations of the dependency of change of free energy of the system during the formation of an alloy on its compn., it is shown that the energy of interaction may lead to the approach of potentials of deposition only at the sp. concentrations of the electronegative component of an alloy.—A. W.

BY any

POLUKAROV, Yu.M.; GORBUNOVA, K.M.

Certain problems in the theory of alloy electrodeposition. Part 1.
Computation of the shift in ion-discharge potentials occurring with
the loss to displacement energy during the formation of alloys.
Zhur.fiz.khim. 30 no.3:515-521 Mr '56. (MLRA 9:8)

1. Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva.
(Alloys) (Electroplating) (Potential, Theory of)

POLUKAROV, Yu.M.

Structure and magnetic characteristics of electrolytic deposits
ferromagnetic metals and their alloys, as related to the con-
ditions of their formation. Part 2: A study of the magnetic
characteristics and structure of cobalt electrodeposits. Zhur.fiz.
khim. 34 no.1:150-156 Ja '60. (MIRA 13:5)

1. Akademiya nauk SSSR. Institut fizicheskoy khimii, Moskva.
(Cobalt--Magnetic properties)

POLUKAROV - Yu. M.

POLUKAROV, Yu. M.; GORBUNOVA, K. M.

Electrodeposition of alloys. Part 3. Conditions for nearing
of metal deposition potentials at the expense of alloying
energy (with English summary in insert). Zhur.fiz.khim.
30 no.4:878-881 Apr. '56. (MLRA 9:9)

1. Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva.
(Alloys) (Electroplating)

POLUKAROV, Yu.M.; GORBUNOVA, K.M.

Theory of the electrodeposition of alloys. Part 6: Formation mechanism of supersaturated solid solutions and formation of two-phase systems during the electrocrystallization of alloys [with summary in English]. Zhur. fiz. khim. 32 no.4:762-768 Ap '58. (MIRA 11:6)

1. Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva.
(Alloys) (Electroplating)

137-58-4-7842

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 4, p 211 (USSR)

AUTHORS: Gorbunova, K. M., Popova, O. S., Sutyagina, A. A., Polukarov, Yu. M.

TITLE: Mechanism of Growth and Structure of Precipitates of Metals Produced by Electrical Crystallization (Mekhanizm rosta i stro-yeniye osadkov metalla, vznikayushchikh pri elektrokristallizatsii)

PERIODICAL: V sb.: Rost kristallov. Moscow, AN SSSR, 1957, pp 58-66

ABSTRACT: Certain principles of the growth on the cathode of an electrolytic cell of deposits (D) of metal in the form of dense coatings or loose dendritic structures are examined. K. M. Gorbunova shows that when single crystals are formed, an increase in current I results in the $I/\Sigma S-K$ ratio remaining constant because of the increase in the surface of growth. This latter results in a transition from growth of the single crystal to the growth of multicrystalline D (a relatively high concentration of discharging ions occurs) or to a growth of dendritic D (a low concentration of discharging ions). Dense polycrystalline D grow when $\Sigma S-S$ is attained at the cathode. Subsequently, further increase in I can occur only when there is

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137-58-4-7842

Mechanism of Growth and Structure (cont.)

a drop in the concentration of ions at the cathode. At a given I , the ion concentration at the cathode may prove to be close to zero: the maximum diffusion current is attained (MDC). Powder D form upon electrocrystallization under MDC conditions. The particles of the powder D are extremely fine dendrites, the angles between the branches of which are determined by the crystallographic nature of the metal. For Zn powder, the angle is 60° . In dense crystalline D the anisotropy of properties such as the magnetic, the linear compressibility, resistivity, thermal expansion, resistance to corrosion, etc., are determined by texture (orientation of all the crystals of the D in a given crystallographic direction). The authors hold that in the case of D with crystals above a certain size and small internal stresses (IS), it is more accurate to regard texture as "growth texture." Texture comes into being as the result of competition between crystals of different orientations, as the ionic building blocks brought up to the growing crystals are put to use. The change in the texture axis with change in the conditions of electrolysis is explained by the change in the ratios of the growth rates in different directions. The unique adherence of the texture of Zn and Cd D to a 6th-order axis $[0001]_c$ on application of an alternating current, with the surfaces bounded not by apices but by the faces of the base, may be explained in terms of the concepts developed by Kaishev and Bliznakov. X-ray and magnetic studies have made it possible to determine

Card 2/3

137-58-4-7842

Mechanism of Growth and Structure (cont.)

that IS anisotropy exists in Ni deposits, and also that the IS of Ni is not directly related to the amount of occluded H_2 . Introduction of brightening agents in the bath leads to the formation of deposits not having the definite, clearly defined boundaries characteristic of crystals, and the D consist of rounded forms.

O. P.

1. Cathodes--Deposits--Structural analysis
2. Metals--Crystallization--Structural analysis

Card 3/3

BONDAR', V.V.; MEL'NIKOVA, M.M.; POLUKAROV, Yu.M.

Electrodeposition of hard magnetic alloys; preliminary report.
NTI no.1:28 '64. (MIRA 17:3)

POLUKAROV, Yu.M.; GORBUNOVA, K.M.

Some problems in the theory of the electrodeposition of alloys.
Part 4: Oscillographic study of the cathodic potential in the
alloy deposition process [with summary in English]. Zhur. fiz.
khim. 31 no.10:2281-2287 O '57. (MIRA 11:3)

1. Institut fizicheskoy khimii AN SSSR.
(Alloys) (Electroplating) (Potential, Theory of)

AUTHORS: Polukarov, Yu. M., Gorbunova, K. M. 76-32-4-5/43

TITLE: Some Problems Concerning the Theory of Electro-Deposition of Alloys (Nekotoryye voprosy teorii elektrosazhdeniya splavov).
VI. The Mechanism of the Formation of Supersaturated Solid Solutions and of Two-Phase Systems During the Electrocrystallization of Alloys (VI. O mekhanizme obrazovaniya peresyschennykh tverdykh rastvorov i dvukhfaznykh sistem pri elektrokristallizatsii splavov)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 4, pp. 762-768 (USSR)

ABSTRACT: After Jacobi (Reference 1) found the possibility of electric copper and zinc deposition the problem arose if the deposit was a mixture of the metallic crystals or an alloy. This problem was radiographically investigated; works by Nakamura (Reference 1), Kersten (Reference 2), Roux and Cournot (Reference 3), Stillwell and Stout (Reference 4), Umanskiy and Layner (Reference 6) Bechard (Reference 9), Raub and Krause (Reference 10)

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Some Problems Concerning the Theory of Electro-
Deposition of Alloys.

76-32-4-5/43

VI. The Mechanism of the Formation of Supersaturated
Solid Solutions and of Two-Phase Systems During the
Electrocrystallization of Alloys

and by Raub and Engel (References 13, 16) are known in this connection, and they are explained in the present paper. As the problem mentioned in the title has never been examined until now and on the other hand might be an important contribution to the prediction of alloying properties the authors investigated in this paper the formation and the growth of a new alloying phase on the cathode. The increase of the cathode potential with the connection to the current source was already observed by Volmer et al. (Reference 21), he also explained it and afterwards they made considerations in connection with the change of the cathode potential which are to make possible the determination of the deposition structure. For this purpose investigations of the function of the deposition structure of the alloy on the magnitude of the cathode potential were carried out. From the experimental part can be seen that three systems were used: copper-silver, copper-lead, and copper-nickel. It was observed

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Some Problems Concerning the Theory of Electro-
-Deposition of Alloys.

76-32-4-5/43

VI. The Mechanism of the Formation of Supersaturated
Solid Solutions and of Two-Phase Systems During the
Electrocrystallization of Alloys

that in the case of electro-depositions which are located at cathode potentials in the near of the potential of equilibrium (with lead) the formation of supersaturated solid solutions (of lead in copper) are to be expected, while in the case of depositions of alloys with higher chemical polarization at high current densities the formation of two-phase systems can take place, also in systems which in equilibrium supply a continuous series of solid solutions. The deposition of the copper-nickel alloy is mentioned as example; here a solid solution separates at low current densities, while at high current densities the excess voltage is so great that an own formation of nickel phase takes place.

There are 3 figures, 1 table and 23 references, 7 of which are Soviet.

Card 3/4

Some Problems Concerning the Theory of Electro-
Deposition of Alloys.

76-32-4-5/43

VI. The Mechanism of the Formation of Supersaturated Solid
Solutions and of Two-Phase Systems During the Electrocrystallization
of Alloys.

ASSOCIATION: Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva
(Institute of Physical Chemistry, AS USSR, Moscow)

SUBMITTED: September 4, 1957

AVAILABLE: Library of Congress

1. Alloys--Electrodeposition 2. Electrodeposition--Theory

Card 4/4

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POLUKAROV, N

PROCESSES AND PROPERTIES INDEX

New methods for the scouring of wool. I. Emulsions with triethanolamine and ethylene glycol. V. V. Golosov. *Tekstil. Prom.* 6, No. 9/10, 27-8 (1940).—Owing to wartime unavailability of oleic acid and coriander oil, which were used in amts. varying from 20 to 30% in combination with 1-2% Na_2CO_3 and 79-88% H_2O for the scouring of wool, substitutes were developed with little or none of these emulsifying agents. Mineral-oil emulsions consisting of solar or spindle oil (20-30%), Na_2CO_3 or 20% NH_4OH soln. (1-2%), and H_2O (79-88%), emulsions containing of an emulsifier such as Kontakt or Nekal in place of this alkali, and emulsions containing 15-25% of solar or spindle oil, 5-10% olein, 1-2% of Na_2CO_3 or of 20% NH_4OH , and 79-83% water were developed, containing no oleic acid. The present work involves development of emulsions containing 14-19% of oleic acid, 6% triethanolamine, and 89-75% of perfume oil or transformer oil, as well as emulsions containing ethylene glycol: 25% glycol, 3% oleic acid, 0.5% of 25% NH_4OH or 12.5% glycol, 5% oleic acid, and 1% triethanolamine. These emulsions result in a partial saving of oleic acid and are odorless, oxidation-resistant, and very stable. II. Emulsions without olein. N. Polukarpov. *Ibid.* 28.—In an attempt to produce wool-scouring emulsions containing no olein, the following formulations were obtained: 300 g. tall oil, 90 g. 36% NaOH , 110 g. H_2O , 600 g. mineral or shale oil, this mixture then being dild. 3:1 with H_2O ; 150 g. sulfonated tall oil, 70 g. 36% NaOH , 200 g. H_2O , 600 g. mineral or shale oil, this mixture then being dild. 3:1 with H_2O . Such emulsions are now in use in the factory where they were devised. Marshall Sittig

ASS. SLA METALLURGICAL LITERATURE

POLUKAROV YU. A.

PHASE I BOOK EXPLOITATION 30V/2216

5(4)

Sovetskoye po elektrokhemii. 4th, Moscow, 1956

Trudy... (abornik) [Transactions of the Fourth Conference on Electrochemistry: Collection of Articles] Moscow, Izd-vo AN SSSR, 1959. 868 p. Errata slip inserted. 2,500 copies printed. Sponsoring Agency: Akademiya nauk SSSR. Otdeleniye khimicheskikh nauk.

Editorial Board: A.M. Prunkin (Resp. Ed.) Academician, O.A. Yezin Professor, S.I. Zhdanov (Resp. Secretary), B.N. Kabanov, Professor, S.I. Zhdanov (Resp. Secretary), B.N. Kabanov, Professor, I.A. M. Kolytynin, Doctor of Chemical Sciences, V.V. Losev, P.D. Lukovitskiy, Doctor of Chemical Sciences, V.V. Stender, Professor, and G.M. Plotskiy, Ed. of Publishing House: N.G. Yegorov; Tech. Ed.: T.A. Prusakova.

PURPOSE: This book is intended for chemical and electrical engineers, physicists, metallurgists and researchers interested in various aspects of electrochemistry.

COVERAGE: The book contains 127 of the 138 reports presented at the Fourth Conference on Electrochemistry sponsored by the Department of Chemical Sciences and the Institute of Physical Chemistry, Academy of Sciences, USSR. The collection pertains to different branches of electrochemical kinetics, double layer theories and galvanic processes in metal electrodeposition and industrial electropolymerization. Abridged discussions are given at the end of each division. The majority of reports not included here have been published in periodical literature. No personalities are mentioned. References are given at the end of most of the articles.

Transactions of the Fourth Conference (Cont.) 30V/2216

Salmov, M.V. and I.D. Yushina (Ural'skiy filial AN SSSR-Ural Branch, Academy of Sciences, USSR) Cathodic Processes During the Precipitation of Thorium From Fused Electrolytes 348

Gul'din, I.I. and A.V. Ruzhinskaya (Gosudarstvennyy nauchno-issledovatel'skiy institut tsvetnykh metallov-State Scientific Research Institute of Nonferrous Metals). Mechanism of the Reduction of Galena From Suspensions in Fused Mixtures of Magnesium and Sodium Chlorides at a Liquid-Lead Cathode 352

Panchenko, I.D. (Institut obshchey i neorganicheskoy khimii AN USSR-Institute of General and Inorganic Chemistry, Academy of Sciences, USSR). Equation for a Polarographic Wave at Solid Electrodes in Fused Salts 355

Chornyk, M.G. (Aviatsionnyy institut kuybyshev-Aviation Institute, Kuybyshev). Some Problems of the Polarography of Fused Electrolytes 356

Vaysburd, S. Ye., and V.L. Kheyfets (Gosudarstvennyy institut Card 15/34

State Institute for the Research of Metallurgy and the Nickel Industry). Decomposition Voltage and Properties of Slags Used in Nonferrous Metallurgy 362

Discussion [V.P. Mahovets and contributing authors] 365

PART V. THE ELECTRODEPOSITION OF METALS 369

Kalshayev-Romanov (Physical Institute of the Bulgarian Academy of Sciences). Spiral Growth and Overvoltage During the Electrocrystallization of Silver 371

Bokris, J.O.M., U. Mil, and B.E. Conway (U.S.A.). Determination of Faraday Impedance at Solid Electrodes and Factors Which Determine Rate During the Electrodeposition of Copper 380

Varganyan, A.T. Nonhomogeneity of an Electrode Surface and Card 16/34

the Mechanism of the Electrodeposition of Metals 393

Polukarov, Yu. A., and K.M. Gorbunova (Institute of Physical Chemistry, Academy of Sciences, USSR). Some Theoretical Problems in the Electrocrystallization of Alloys 404

POLUKAROV, YU. M.

Defended his Dissertation for Candidate of Chemical Sciences, Institute of Physical Chemistry, Academy of Sciences USSR, Moscow, 1953

Dissertation: "Electrochemical and Structural Investigation of the Mechanism of Electrolytic Deposition of Alloys"

SO: Referativnyi Zhurnal Khimii, No. 1, Oct. 1953 (W/29:55, 26 Apr 54)

BONDAR', V.V.; POIUKAROV, Yu. M.

Zone formation on electrodes in the process of electric crystallization of metals. Dokl. AN SSSR 120 no. 3:552-553 My '58. (MIRA 11:7)

1. Predstavleno akademikom A.N.Frumkinym.
(Electrodes)
(Electroplating)

Polukarov, Yu. M.

76-10-16/34

AUTHORS: Polukarov, Yu.M., Gorbunova, K.M.

TITLE: Some Problems in the Theory of the Electrodeposition of Alloys. IV. Oscillographic Study of the Cathodic Potential in the Alloy Deposition Process. (Nekotoryye voprosy teorii elektroosazhdeniya splavov. IV. Ostsillograficheskoye issledovaniye potentsiala katoda v protsesse osazhdeniya splavov)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 10, pp. 2281-2287 (USSR)

ABSTRACT: It was the purpose of the task to explain the dependence of the character of the cathode potential variation on the phase structure of the forming alloy (continuous series of solid solutions, some solid solutions, formation of chemical compounds or eutectic mixture). The attention in the investigation was attracted by the solution of the question whether the ion discharge takes place simultaneously in both metals or subsequently and to which extent the type of the resulting deposition structure is connected with the electrochemical characteristics of the process. It is shown that the ion discharge in the formation of silver-mercury and silver-cadmium alloys which occur at the ca-

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76-10-16/34

Some Problems in the Theory of the Electrodeposition of Alloys. IV. Oscillographic Study of the Cathodic Potential in the Alloy Deposition Process

thode potentials which exceed the potentials of the ion discharges of the metal electronegative to the greatest extent given in the solution, occurs simultaneously and not by means of a subsequent discharge process of the various ions. This detection agrees with the data of the radiographic analyses carried out by different authors. On the strength of the microscopic observation it is shown that the potential fluctuation found in some cases at the surface of the mercury is in the case of deposition of the silver-mercury alloy connected with the periodic dissolution of the α -phase of the alloy in mercury. There are 4 figures and 4 Slavic references.

ASSOCIATION: Institute for Physical Chemistry of the AN USSR
(Akademiya nauk SSSR. Institut fizicheskoy khimii)

SUBMITTED: September 4, 1956

AVAILABLE: Library of Congress

Card 2/2

POLUKAROV, Yu.M. (Moscow); GORBUNOVA, K.M. (Moscow)

Some problems in the theory of the electrodeposition alloys.
Part 5: An oscillographic investigation of the cathode potential
in the deposition of alloys of the system copper - zinc, copper -
lead and nickel - cobalt [with summary in English]. Zhur. fiz. khim.
31 no.12:2 682-2689 D '57. (MIRA 11:4)

1. Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva.
(Alloys--Electric properties)
(Electroplating)

AUTHORS: POLUKAROV, YU M.
Polukarov, Yu.M., Gorbunova, K.M. 76-12-12/27

TITLE: Some Questions From the Theory on the Electro-Deposition of Alloys
(Nekotoryye voprosy teorii elektroosazhdeniya splavov)
V. Oscillographic Investigation of the Cathode-Potential During the
Deposition of the Alloy (Copper-Zinc, Copper-Lead, and Nickel-
Cobalt Systems) (V. Ostsillograficheskoye issledovaniye potentsiala
katoda v protsesse osazhdeniya splava (sistemy med'-tsink, med'-
svinets i nickel' -kobal't)).

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 12, pp.2682-2689 (USSR)

ABSTRACT: The following systems were investigated: Copper-zinc system (a system
with some solid solutions and a considerable amount of mixture-
energy), copper-lead system (system of eutectic type), and the nick-
el-cobalt system (continuous series of solid solutions). The method
described in the previous work Ref. 1 was applied. The following
was stated: 1.) Potential-changes with a great period of oscillation
within which oscillations with a smaller period took place, were
stated with the depositions of the copper-lead and nickel-cobalt
alloys. 2.) It was stated that the great periods of cathode-poten-
tial-change (with the deposition of nickel-cobalt- and copper-lead

Card 1/3

Some Questions From the Theory on the Electro-Deposition of Alloys. V. Oscillographic Investigation of the Cathode-Potential During the Deposition of the Alloy (Copper-Zinc, Copper-Lead, and Nickel-Cobalt Systems)

76-12-12/27

alloys) recorded on the oscillograms, correspond to the time required for the formation of a layer in the deposition. 3.) In order to clarify the nature of the potential-oscillations during the Process of depositions of alloys, which is accompanied by a process of hydrogen separation, oscillograms for the process of hydrogen-ion-discharge on copper and zinc from a cyanogen solution were plotted. It was shown in this context that the cathode-potential with the discharge of hydrogen-ions changes periodically. 4.) It was stated that the potential oscillations with a small period at the deposition of alloys depend on the process of hydrogen-precipitation. 5.) No substantial difference was discovered in the character of the change of the cathode-potential during the process of ion-discharge with formation of alloys which belong to the various types of equilibrium diagrams. There are 5 figures, and 6 references, 5 of which are Slavic.

Card 2/3

Some Questions From the Theory on the Electro-Deposition
of Alloys. V. Oscillographic Investigation of the Cathode-
Potential During the Deposition of the Alloy (Copper-Zinc,
Copper-Lead, and Nickel-Cobalt Systems)

76-12-12/27

ASSOCIATION: AN USSR. Institute of Physical Chemistry, Moscow (Akademiya
nauk SSSR. Institut fizicheskoy khimii, Moskva).

SUBMITTED: September 4, 1956

AVAILABLE: Library of Congress

Card 3/3

POLUKHIN 4a.14

USSR/Physical Chemistry - Electrochemistry.

B-12

Abs Jour : Referat Zhur - Khimiya, No 6, 25 March 1957, 18706

Author : Polukhov, Yu.M., and Gorbunova, K.M.

Inst : RZhKhim, 1956, 71289

Title : Some Problems of the Theory of Electroprecipitation of Alloys. II. Examination of the Displacement of Potentials of the Discharge of Ions When the Alloy is Being Formed.

Orig Pub : Zh. fiz. khimii, 1956, 30, No 4, 871-877

Abstract : The authors investigated the possibility of utilizing the values, computed from thermochemical data and referring to the displacement of a counterbalanced potential of an electronegative metal, for the energy of its interaction with another metal, in order to solve the question of potentials of ion discharge during the electroprecipitation of an alloy which precipitation is an unbalanced process. On the basis of electrochemical investigation in aqueous solutions and in molten electrolytes, it is

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IGLUKAROV, Yu.M.; CORBUNOVA, K.M.; BONDAR', V.V.

Certain aspects of the theory of electrodeposition of alloys.
Part 8. Zhur. fiz. khim. 36 no.9:1870-1876 S '62.

(MIRA 1966)

1. Institut fizicheskoy khimii AN SSSR.

POLUKAROV, Yu.M.; GORBUNOVA, K.M.

Electrodeposition of alloys. Part 2. Investigation of the shift in the ionic discharge potentials during alloy information (with English summary in insert). Zhur.fiz.khim. 30 no.4:871-877 Apr. '56. (MLRA 9:9)

1. Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva.
(Alloys) (Electroplating)

S/081/62/000/008/032/057
B156/B101

AUTHORS: Gorbunova, K. M., Polukarov, Yu. M.

TITLE: Electrocrystallization of alloys

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 8, 1962, 370, abstract
8K180 (Sb. "Elektrolit. osazhdeniye splavov", M., Mashgiz,
1961, 31-56)

TEXT: The conditions under which electrolytic alloys of various phase structures are formed at the cathode are examined. The results of research carried out with the binary Cu-Bi, Cu-Pb, Cu-Tl, Cu-Sn, and Cu-Cd alloys obtained from perchloric acid electrolytes are given. Methods of investigating alloys obtained by electrodeposition are described. 39 references. [Abstracter's note: Complete translation.] ✓

Card 1/1

S/137/62/000/004/145/201
A060/A101

18.1140

AUTHOR: Polukarov, Yu. M.

TITLE: Production of coatings with special magnetic properties

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 4, 1962, 106, abstract 41648
(V sb. "Elektrolyt. osazhdeniye splavov", Moscow, Mashgiz, 1961,
57 - 75)

TEXT: The article considers the deposition of coatings from magnetically rigid materials with high coercive force H_c . The mechanism of formation of high coercivity coatings from Co-W alloys was studied in citric acid electrolyte. The possibility is demonstrated of obtaining high coercivity alloys on the Co-W alloy base. The composition of the electrolyte and the working schedule which make it possible to obtain deposits with H_c 500 - 600 oersteds are cited. The structure of Co-W alloys is investigated. On the basis of magnetic and structural investigations it is demonstrated that Co deposits obtained at sufficiently high cathode potentials consist of a phase of a solid solution of W in Co (frequently oversaturated) and a phase of the chemical compound Co_3W . The value of

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Card 1/2

ALEKSEYEVSKIY, N.Ye.; BONDAR', V.V.; POLUKAROV, Yu.M.

Superconductivity of electrolytically deposited copper-bismuth alloys. Zhur. eksp. i teor. fiz. 38 no.1:294-295 Jan '60. (MIRA 14:9)

1. Institut fizicheskikh problem AN SSSR.
(Superconductivity) (Copper-bismuth alloys--Electric properties)

APPROVED FOR RELEASE: 06/15/2000

CIA-RDP86-00513R001341910019-2"

S/137/62/000/005/112/150
A006/A101

AUTHORS: Gorbunova, K. M., Polukarov, Yu. M.

TITLE: Electrocrystallization of alloys

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 5, 1962, 115, abstract 5I702
(V sb. "Elektrolit. osazhdeniye splavov", Moscow, Mashgiz, 1961, 31-56)

TEXT: The dependence of alloy structures on electrochemical parameters of the process is analyzed theoretically and experimentally. There are 39 references.

Ye. Layner

[Abstracter's note: Complete translation]

L 25344-65 EWT(1)/EWG(k)/EWT(m)/T/EWP(b)/EWA(h)/EWP(t) Peb/Pz-6 IJP(c) JD/AT

ACCESSION NR: AR4039573

S/0081/64/000/005/B096/B096

SOURCE: Ref. zh. Khimiya, Abs. 5B675

AUTHOR: Smirnov, G. V.; Polukarov, Yu. M.; Arslambekov, V. A.

TITLE: Effect of electrochemical treatment on the rate of surface recombination of germanium in various gas media 21

CITED SOURCE: Sb. Poverkhnostn. svoystva poluprovodnikov. M., AN SSSR, 1962, 93-100

TOPIC TAGS: germanium semiconductor, semiconductor preparation, germanium surface recombination, germanium polarization, anodic polarization, charge carrier

TRANSLATION: The authors studied the rate of surface recombination S in various gas media on samples of n-type Ge subjected to electrochemical treatment. During the process of washing in water, the samples were anodically polarized so that metallic impurities present in the water could not precipitate out on the Ge surface. The value of S was measured in air, in a vacuum of 10^{-6} - 10^{-7} mm Hg, and in a vacuum after heating at 120C. Washing with simultaneous anodic polarization permitted samples of Ge to be obtained with a low rate of surface recombination

Cord 1/2

L 25344-65

ACCESSION NR: AR4039573

of charge carriers.

SUB CODE: SS, ME

ENCL: 00

Cord 2/2

L 32905-65 EWT(m)/EPA(p)-2/EWA(d)/EWP(t)/EPA(bb)-2/EWP(b) Pad/Pt-10 IJP(c)
S/0000/64/000/000/0117/0123 JD/HW/GS

ACCESSION NR: AT5004145

AUTHOR: Bondar', V.V.; Melnikova, M.M.; Polukarov, Yu. M.

TITLE: Electrodeposition of magnetically-hard alloys. Part I. Electrodeposition of a cobalt-phosphorus alloy

SOURCE: AN SSSR. Institut nauchnoy informatsii. Informatsionnyye sistemy (Information systems). Moscow, 1964, 117-123

TOPIC TAGS: magnetic memory, magnetically hard alloy, alloy magnetic property, alloy electrodeposition, cobalt alloy, phosphorus containing alloy

ABSTRACT: The authors call attention to the interest centering on the development of miniaturized machine memories using thin magnetic films for high-density information storage and to the use of electrodeposited ferromagnetic alloys for these purposes. The magnetic coverings used in information storage must possess a high coercive force (better than 500 oersteds), residual induction and orthogonality factor; that is $B_r/B_m > 0.5$. The work reported on in this article was carried out in the Laboratoriya elektromodelirovaniya (Electrosimulation laboratory) of VINITI for the purpose of determining and investigating the properties of magnetically-hard alloys employed in the recording stage of the overall information-storage problem. Of the different alloys presently in use as carriers of